

## REMARKS

Issues outstanding in this application are as follows:

- The Title and Abstract are objected to.
- Claims 1, 3, 9 and 11-15 are rejected under 35 U.S.C. 112, second paragraph, as omitting an essential element.
- Claims 1, 3, 9, and 11-16 are rejected under 35 U.S.C. 112, first paragraph, as not enabled by the Specification in view of the skill in the art and the knowledge in the art.
- Claims 1, 3, 9, and 11-16 are rejected under 35 U.S.C. 112, second paragraph, as indefinite for use of the term synthetic.
- Claims 1, 3, 9, and 11-16 are rejected under 35 U.S.C. 112, first paragraph, as not complying with the written description requirement.

### I. TITLE & ABSTRACT

The Title and Abstract have been amended. Applicant requests the objections be removed.

### II. 35 U.S.C. 112, SECOND PARAGRAPH

- A. Claims 1, 3, 9 and 11-15 are rejected under 35 U.S.C. 112, second paragraph, as omitting an essential element.

The Examiner refers Applicant to MPEP § 2172.01 in regard to the rejections regarding conditions suitable for conversion. Applicant in turn refers the Examiner to the same section:

A claim which omits matter disclosed to be essential to the invention as described in the specification or in other statements of record may be rejected under 35 U.S.C. 112, first paragraph, as not enabling.

The Examiner's rejection is pursuant to 35 U.S.C. 112, second paragraph, and thus Applicant infers that the above is not the basis of the rejection. The other potential basis would be:

In addition, a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under 35 U.S.C. 112, second paragraph, for failure to point out and distinctly claim the invention.

The Examiner does not allege that the claims fail to interrelate elements thereof which the Specification describes as a necessary interrelationship of the elements of the invention. Because the Examiner fails to set forth a *prima facie* case in support of the alleged omission of an essential element or essential interrelation of elements, as defined by the Applicant's specification, Applicant requests the rejection be withdrawn.

- B.** Claims 1, 3, 9, and 11-16 are rejected under 35 U.S.C. 112, second paragraph, as indefinite for use of the term synthetic.

Relative terminology is discussed at MPEP § 2173.05(b) (Relative Terminology). The fact that claim language, including terms of degree, may not be precise, does not automatically render the claim indefinite under 35 U.S.C. 112, second paragraph. *Id.* The Examiner rejects the term "synthetic" as used in the pending claims as a relative term that renders the claims indefinite. Applicant respectfully submits that synthetic is not a relative term. *Id.* (Examples are "about," "essentially," "similar," "substantially," "type" as in "ZSM-5-type aluminosilicate zeolites," etc.).

At a minimum, the Examiner's explanation of the rejection's basis is so lacking that Applicant cannot ascertain how the Examiner has arrived at the conclusion of indefiniteness. The claims do not define "synthetic," but claims do not normally function to define terms. The specification "does not provide a standard for ascertaining the requisite degree." Applicant infers this relates to a lack of standards of measurement in the specification for the degree of "syntheticness." *Id.* If the claims were directed to "substantially synthetic petroleum" this perhaps could make sense as a rejection. Finally, the Examiner alleges one of ordinary skill in

the art would not be reasonably appraised of the metes and bounds of the claims. While this certainly is the legal conclusion upon which one bases an indefiniteness rejection, such a rejection is not made out by conclusory reciting that the legal standard is not met. Because the term synthetic is not a relative term and the Examiner has not articulated any basis for determining the rejected claims are indefinite, Applicant respectfully requests the rejection be withdrawn.

### **III. 35 U.S.C. 112, FIRST PARAGRAPH**

#### **A. Written Description - Claims 1, 3, 9, and 11-16 are rejected under 35 U.S.C. 112, first paragraph, as lacking basis for the terms synthetic petroleum and synthetic coal.**

The Examiner has rejected synthetic petroleum/coal as lacking support in the specification. To be precise, the Examiner states, "There is no basis for these terms in the originally filed application and thus these terms constitute new matter." While a lack of any basis for claimed subject matter is the legal conclusion upon which a new matter rejection is based, such a rejection is not made out by simply alleging that the legal standard is not met. MPEP § 2163.04. In addition, Applicant contends that the Examiner is implicitly applying an improper requirement for literal antecedent support of claims terms. MPEP § 2163.02. Because the Examiner does not carry the required burden of establishing a *prima facie* case and/or applies an improper standard, Applicant respectfully requests the rejection be withdrawn.

#### **B. Enablement - Claims 1, 3, 9, and 11-16 are rejected under 35 U.S.C. 112, first paragraph, as not enabled by the specification.**

In order to make an Enablement rejection, the Examiner has the initial burden to establish a reasonable basis to question the Enablement provided for the claimed invention. MPEP 2164.04; *In re Wright*, 999 F.2d 1557, 1562 (Fed. Cir. 1993). The Examiner attempts to reform and salvage the prior rejection to counter Applicant's immediate prior response. However, the Examiner's analysis is still fundamentally flawed by reliance on references discussing the

problems of commercially viable biofuel production. Thus, the Examiner does not put forward a reasonable basis to question the scope of Enablement.

1. Nature of the invention and breadth of claims

The Examiner's treatment of this *Wands* factor is derived from the Examiner's analysis of the other *Wands* factors. The Examiner construes the claims as broadened by the previous claim amendments. Consequently, the Examiner reiterates this *Wands* factor weighs against enablement in view of the other *Wands* factors, in particular the alleged Unpredictability in the art. Applicant submits the breadth of the claims as previously amended are fully enabled, as discussed below for the other *Wands* factors.

2. Working Examples

The Examiner agrees that Working Examples are not mandatory. However the Specification does provide a prophetic working example, as discussed previously. See [0008] of the published Application. The Examiner dismisses this disclosure on the grounds that there is no Guidance in the Specification on carrying out the prophetic working example. The Examiner thus makes this *Wands* factor derivative of the Guidance factor. Applicant disagrees that the Specification lacks Guidance as discussed under that heading. Consequently Applicant contends the Examiner's analysis of this *Wands* factor is in error.

3. Quantity of Experimentation

The Examiner makes the analysis of this *Wands* factor largely derivative of the Unpredictability factor and the Examiner's underlying references relied upon:

The extremely large quantity of experimentation necessary to arrive at Applicant's claimed invention is supported by the teachings of Zaldivar et al., Lin et al., Jeffries et al., and Hamme et al. who each teach the difficulties of making just one synthetic component of coal or petroleum whereas the claimed invention is for methods of making mixtures of components, i.e. synthetic coal and synthetic petroleum.

Because the Examiner's cited references are directed to commercial/industrial production, they do not support the Examiner's position. The Examiner's derivative conclusion on the Quantity of Experimentation is thus in error.

4. Unpredictability of the Art and the State of The Art

The Examiner's continued misinterpretation of the prior art renders the analysis of this *Wands* factor erroneous. The Examiner relies on Zaldivar et al., Lin et al., Jeffries et al. and now Hamme et al. to support the position that practicing the claimed methods would be highly unpredictable. Applicant has already discussed how the first three references are directed to commercial scale production issues and thus do not support the Examiner's rejection. The Examiner implicitly concedes that commercial viability is not the proper criterion and further mischaracterizes the contents of the cited references in an attempt to salvage a factual basis for the reiterated rejection.

a. Zaldivar et al.

The Examiner relies heavily of the contents of Zaldivar et al. In the first office action on the merits, The Examiner cited Zaldivar et al. for the following:

Page 30, final paragraph:

However, keeping a realistic perspective is important. The improvement achieved in the fermentation step with the help of metabolic engineering is just one of the aspects of an integrated process. Hence, several pieces still remain to be properly assembled (and optimized) before an efficient industrial configuration is acquired. It is therefore anticipated that once in operation, the current model technologies will need several cycles of improvement/analysis, before optimization and competitiveness are achieved.

As is clear from the foregoing, Zaldivar et al. is directed to commercialization of ethanol production from lignocellulose. Because this is not the standard by which Enablement is judged, the Examiner's original reliance was in error. The Examiner attempts to rehabilitate Zaldivar et al. by citing the second paragraph of the introduction (Final Office action, mailed 11 Dec. 2007, pg. 7):

Mature technologies for ethanol production are crop-based, utilizing substrates such as sugar cane juice and cornstarch. Since the cost of raw materials can be as high as 40% of the bioethanol cost (von Sivers et al. 1994 and earlier references therein; Wyman 1999), recent efforts have concentrated on utilizing lignocellulose. This natural and potentially cheap and abundant polymer is found as agricultural waste (wheat straw, corn stalks, soybean residues, sugar cane bagasse), industrial waste (pulp and paper industry), forestry residues, municipal solid waste, etc. (Wiseloge et al. 1996). It has been estimated that lignocellulose accounts for about 50% of the biomass in the world (10–50 billion tons according to Claassen et al. 1999).

The Examiner compares the claimed methods as closer to lignocellulose based ethanol production. The Examiner then argues that Zaldivar et al. teaches that such production is more difficult than the crop based, ethanol production technologies (i.e. less predictable). Alternatively the Examiner relies on Zaldivar et al. as teaching the unpredictability of improving

ethanol production. Zaldivar et al. teaches that the lignocellulose based productions technologies are more difficult to develop and/or scale up as *commercially* viable industrial processes:

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**Processes for bioethanol production**

In the production of bioethanol, several steps are interrelated: feedstock collection, transportation to the manufacturing center, preparation of the raw material, hydrolysis, fermentation, steam generation, product concentration (distillation), and waste disposal (Olsson and Hahn-Hägerdal 1996). These operations need to be fully optimized for an efficient ethanol plant. In Fig. 4, the current processes for crop-based ethanol production and a proposed model for lignocellulose-based ethanol production are compared.

*High ethanol yields and productivity*

With ethanol being a low value-added product, the overall yield in the conversion of sugars to ethanol is pivotal. Utilizing crop sugars as substrates for ethanol production, yields of 90–95% of the theoretical can be obtained using *S. cerevisiae* or *Z. mobilis*, and yields in this range are also required for an economically feasible process based on lignocellulose as raw material. However, of equal importance to the yield is a high productivity, since the depreciation of capital investments also contributes significantly to the cost of ethanol production.

*Capability of utilizing sugars simultaneously*

The ideal situation in an industrial setting is to have a microorganism able to consume allsugars simultaneously during growth in a medium containing a mixture of glucose and other sugars. This could result in shorter fermentation time, consequently improving volumetric productivities.

The Examiner's citation of the paper's Title as a basis, reinforces the lack of a substantive basis in Zaldivar et al. for the Examiner's position. Zaldivar et al. describes issues arising in efforts to design industrial scale, commercially viable, lignocellulose based ethanol production schemes. The Examiner's reliance thereon is in error. *CFMT, Inc. v. YieldUP International Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003) ("Enablement does not require an inventor to meet lofty standards for success in the commercial marketplace. Title 35 does not require that a patent disclosure enable one of ordinary skill in the art to make and use a perfected, commercially viable embodiment absent a claim limitation to that effect.").

**b. Jeffries et al.**

Jeffries et al. is cited for the following:

**However, the bioconversion of pentoses to ethanol still presents a considerable economic and technical challenge (Jeffries and Shi 1999; Aristidou and Penttilä 2000; Hahn-Hägerdal et al. 2001).**

This is relied upon as a post filing confirmation of the alleged contents of Zaldivar et al. that the Examiner cites for the Unpredictability factor. Office Action mailed 22 Jan. 2007, pg. 9-10 (bridging). As with the primary reference, the Examiner's reliance on Jeffries et al. is in error:

Metabolic engineering enables *S. cerevisiae* to ferment D-xylose and L-arabinose to ethanol and it improves the capacity of native xylose-fermenting yeasts, such as *P. stipitis*. The improvement obtained with any one change has been incremental. Co-production of xylitol, low ethanol production rates, requirements for oxygen and co-metabolizable carbon sources remain problems with recombinant *S. cerevisiae*. Most trials use haploid laboratory strains rather than industrial yeasts for their genetic backgrounds and trials with mixed sugar hydrolysates are not often reported. Mutagenesis and strain selection has improved xylose utilization in recombinant strains, but most mutations have not been characterized. In some instances, multiple genes have been altered through deletion or overexpression, but rarely have expression levels been manipulated. There are, therefore, many opportunities to obtain further improvements by learning more about the factors that limit xylose utilization under anaerobic conditions, by selecting better genetic backgrounds for heterologous expression, by expressing multiple genes at optimal levels and by combining the various beneficial traits into single strains. While strain improvement will probably continue for several years, ethanol production rates and yields are becoming practicable for some commercial applications.

Summarizing the above, xylose to ethanol production works, it even works well enough for “some commercial applications,” but it is not a completely mature, industrial technology. This is not a proper basis for questioning for Enablement of the claimed methods. *CFMT, Inc. v. YieldUP International Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003).

c. Lin et al.

The Examiner cites Lin et al. as supporting the Unpredictability of lignocellulose based ethanol production relative to crop based systems. This is identical to the Examiner’s advanced rationale for citing Zaldivar et al. In particular, Lin et al. is cited for the following:

Nearly all fuel ethanol is produced by fermentation of corn glucose in the US or sucrose in Brazil (MacDonald et al. 2001; Rosillo-Calle and Cortez 1998), but any country with a significant agronomic-based economy can use current technology for fuel ethanol fermentation. This is possible because, during the last two decades, technology for ethanol production from nonfood-plant sources has been developed to the point at which large-scale production will be a reality in the next few years. Therefore, agronomic residues such as corn stover (corn cobs and stalks), sugarcane waste, wheat or rice straw, forestry, and paper mill discards, the paper portion of municipal waste and dedicated energy crops—collectively termed “biomass”—can be converted into fuel ethanol. In this field, although bioethanol production has been greatly improved by new technologies, there are still challenges that need further investigations. A further understanding of the ethanol fermentation needs to be reached.

Recently, research has concentrated on the development of improved processes; however, there are still challenges that need further investigations.

This citation does give the appearance of support the Examiner’s original thesis that “large-scale” lignocellulose based ethanol production (i.e. commercial production) was not enabled as of the Lin et al. publication date. Reading the full reference, one quickly ascertains that the Lin et al. does not even support the Examiner’s original thesis:

Currently, some countries in locations with higher ethanol and fuel prices are producing ethanol from cellulosic feedstocks. It is only recently that cost-effective technologies for producing EFC in the US have started to emerge (Badger 2002). In Canada, Iogen Corporation built a small commercial-scale cellulose-ethanol plant using proprietary enzymatic hydrolysis technology. In 1997, they partnered with Petro-Canada to produce cellulose-ethanol beginning with a 1-million-gallon-per-year ethanol demonstration facility, located at Iogen's headquarters in Ottawa, using corn stover and switchgrass (Energy & Environmental Research Center, 2001). In summer 2005, a Swedish plant in Ömsköldsvik started to produce ethanol from sawdust. The production is still in a start-up phase, but the optimism is high. In a not so distant future, Sweden could become self-sufficient of ethanol from wood and wood residues, which would be a much more sustainable way of supplying ethanol to the Swedish market (Advanced course in LCA 2005).

It is clear from the foregoing that a) industrial lignocellulose production technology was enabled and b) that the technical issues discussed in Lin et al. are related to cost-effective production in the US market. Regardless of the Examiner's misinterpretation of Lin et al., Lin et al. does not support the pending Enablement rejection because it discloses technical issues related to commercially viable, large-scale production. *CFMT, Inc. v. YieldUP International Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003).

#### d. Unpredictability Of Gene Transfection

The Examiner adds a further citation to Zaldivar et al. in the pending Final rejection in an effort to salvage the reference and sustain the pending Enablement rejection:

This undesirable and unexpected result emphasized that: (1) the cell is a complex network of regulatory mechanisms, just partially elucidated, which makes it difficult to predict the consequences of the genetic changes introduced;

The full context of the Examiner's above citation is:

In the third case, the simultaneous utilization of maltose and glucose was investigated. The work done for this purpose serves to illustrate the challenges that metabolic engineering confronts when attempting the improvement of strain characteristics. In recombinant strains with an "industrial background," the disruption in *MIG1* did not alleviate glucose repression, in contrast to laboratory strains (Klein et al. 1996, 1997, 1999). This undesirable and unexpected result emphasized that: (1) the cell is a complex network of regulatory mechanisms, just partially elucidated, which makes it difficult to predict the consequences of the genetic changes introduced; (2) efficient strategies for laboratory strains might not be adequate for industrial strains, since genetic background and genetic characteristics may be different; (3) for industrial purposes, it is important that the introduction of a desirable trait does not adversely affect characteristics such as high specific growth rate and low by-product formation (Olsson and Nielsen 2000).

The Examiner's selective quotation, compared to the above, is further evidence that the Examiner's position lacks any factual support. The cited text is related to issues of *industrial* scale production and thus do not support the pending rejection. *CFMT, Inc. v. YieldUP International Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003). Dissecting away "industrial background," "industrial strains" and "industrial purposes" is not a valid means for establishing a *prima facie* case.

e. Unpredictability of Conversion of Solid Fossil Fuels and Oil Tars

The Examiner's original and reiterated Enablement rejection is improperly based on Zaldivar et al., Jefferies et al. and Lin et al. Understandably then, the Examiner produces an additional reference, Hamme et al., in an effort to sustain the Examiner's position. As with the original references, Hamme et al. is mischaracterized and off point and thus does not provide a basis for the Examiner's arguments.

The Examiner cites two “key” portions of Hamme et al. The first is:

Microorganisms are equipped with metabolic machinery to use petroleum as a carbon and energy source. The fundamental aspects of *n*-alkane metabolism and the genes involved have been known for some time. While significant gains have been made in our understanding of the processes involved, the specifics of individual systems and the diversity of systems are yet to be fully described. This section will highlight the recently discovered variability in both the regulation and clustering of alkane degradation genes between species as well as the realization that a single strain may carry multiple genes that code for different enzymes carrying out similar functions. A few rare metabolic pathways will also be discussed.

The Examiner relies upon the above for the position that 1) there is a “lack of knowledge of the genes involved in aerobic conversion” of hydrocarbons and 2) that aerobic conversion of hydrocarbons by microorganisms is unpredictable. As to point 1), the cited content states that *n*-alkane metabolism and the genes therefore “have been known for some time.” The Examiner’s description of Hamme et al. is directly opposite of what is stated. The Examiner cannot establish a *prima facie* case on evidence that does not exist. Point 2) is likewise directly contrary to the teachings on the basic science knowledge of *n*-alkane metabolism and the various commercial applications described by Hamme et al. See, e.g., page 505, Figure 1; Page 522-533 (Treatment of Petroleum Waste; Upgrading and Recovering Petroleum). Again, the Examiner cannot establish a *prima facie* case on evidence that does not exist.

The second “key” portion of Hamme et al. cited is also improperly relied upon for anaerobic metabolism of hydrocarbons:

The diversity and unique properties of the anaerobic hydrocarbon-utilizing bacteria are areas that are in need of more work. While difficult, greater focus on isolating and characterizing the enzymes involved in anaerobic hydrocarbon metabolism is required. Furthermore, uptake, efflux, and chemotaxis, areas only recently explored for aerobes, are topics so far untouched in the anaerobic realm. A balanced shift from molecular biology back to enzymology and protein biochemistry is a move that would benefit the understanding of hydrocarbon metabolism in all areas.

After reviewing some of the extensive work identified in Table 2 (page 513), the authors of Hemme et al. conclude that there is more work to be done in this field. There is always more work to be done in all fields of basic science, no matter how much is already known. The standard for Enablement is not and cannot be Omniscience. The Examiner thus cannot support a *prima facie* case on such a basis. At a minimum, the Examiner has not produced a reasoned analysis of what is lacking in the prior art knowledge base and how that brings into question Enablement of the pending claims.

f. Unpredictability Of Isolating Genes Responsible For Conversion

The Examiner continues with Hamme et al., citing various “excerpts” as teaching that isolation and characterization of genes for *n*-alkane conversion is unpredictable. For example, Table 3 on page 518 is cited for disclosing the revelation that nucleic acid probes for “specific metabolic genes” are only available for previously identified sequences. This in the context of an irrelevant, microbial community analysis discussion (per the Table heading). The Examiner also cites a teaching that the regulation and clustering of alkane metabolizing genes varies among different species of bacteria. This should come as no surprise to anyone with familiar with basic microbiology. Implicit from the citation, the regulation and clustering of alkane metabolizing genes from multiple bacteria are known. This citation thus contradicts the Examiner’s position.

The Examiner cannot produce a *prima facie* case by citing irrelevant truisms and well understood biological facts.

g. Unpredictability of Producing Synthetic Coals or Synthetic Petroleum Using Transfected Microorganisms

The Examiner extends the alleged teachings and analysis discussed above to question the Enablement of the claimed methods. Because none of the Examiner's above evidence or analysis is correct, the Examiner's derivative conclusion for the Unpredictability *Wands* factor is baseless.

5. Guidance in the Specification

Applicant has previously stated how the Examiner's analysis of the Guidance *Wands* factor was invalid. In response, the Examiner begins by relating that the Specification does not provide a single specific gene for use in the claimed methods nor a single exemplary chemical composition for synthetic petroleum. The Examiner seems to confuse the method claims at issue with composition claims directed to a genus of "conversion" genes or a genus of synthetic petroleum compositions. This mismatched analysis aside, the Examiner implicitly presumes that one of ordinary skill in the art operates in a knowledge vacuum. This is done despite the Examiner's own identification of references such as Hemme et al. alleged to be relevant to the art. The Specification also directs one of ordinary skill in the art to particular bacterial species and provides an exemplary subtraction hybridization protocol to identify genes useful in the claimed methods. The Examiner's opening contentions are thus without merit.

Choi et al.

Next Applicant believes the Examiner attempts to rehabilitate the Choi et al. reference. It is unclear because the initial sentence refers to Table 3 of Ishizaki et al. This table only identifies one strain from Choi et al. Applicant assumes the discussion references Figure 3 of Choi et al. The first contention is that Choi et al. derives the seven recombinant strains through "elaborate procedures":

**DNA manipulation and library construction.** Total genomic DNA of *A. latus* was isolated by the procedure described by Marmur (25). A plasmid library of *A. latus* total DNA was constructed by inserting *A. latus* genomic DNA fragments partially digested with *Sau3A*I into *Bam*HI-digested pUC19, followed by transformation into *E. coli* XL1-Blue. Plasmid DNA isolation, agarose gel electrophoresis, and transformation of *E. coli* were carried out as described by Sambrook et al. (30). Restriction enzymes and modifying enzymes were purchased from New England Biolabs, Beverly, Mass., and were used as recommended by the manufacturer.

Applicant contends that the molecular biology tools used in Choi et al. (i.e. Sambrook 1989) are not elaborate from the perspective of one of ordinary skill in the art. Next the procedure used for constructing the original recombinant strain is:

**Cloning and molecular analysis of the *A. latus* PHA biosynthesis genes.** To clone the *A. latus* PHA biosynthesis genes, we used the screening strategy of conferring the ability to accumulate PHB to *E. coli* by an introduced recombinant plasmid. The transformed *E. coli* cells were replica plated on solid PHB accumulation medium. Because PHB-accumulating cells form opaque colonies, the *E. coli* transformants harboring all of the *A. latus* PHA biosynthesis genes will show a turbid colony phenotype if the genes are functionally expressed. The opaque colonies were isolated and separately cultivated in LB medium containing 20 g of glucose per liter. The presence of PHB in recombinant *E. coli* was confirmed by microscopic observation of intracellular inclusion bodies and by gas chromatographic analysis. One recombinant clone accumulating a large amount of PHB was isolated and characterized further. It was found to harbor a 6.3-kb *A. latus* genomic DNA fragment, referred to as AL63. Recombinant plasmid pUC19 containing AL63 was referred to as pJC1.

Applicant contends that shotgun genomic cloning of fragments from an originator microbe, followed by a visual screening for recombinant clones, is not an elaborate process for one of ordinary skill in the art. The resulting pJC1 is one of the functional recombinant strains shown in Figure 3.

Finally Figure 3 reflects the optimization of pJC1 through several alternative expression cloning strategies, including shuttle cloning the genomic fragment into a more stable expression

plasmid available in the art. None of this is elaborate or complicated judged from the perspective of the ordinary skilled artisan.

The Examiner also cites Choi et al. for the proposition that one cannot simply transfect genes into a microbe and invariably achieve gene expression. The reliance on Choi et al. for this point is curious because all seven recombinants constructed, functionally expressed the necessary genes. See Fig. 3. Perhaps the Examiner means that one must provide operable transformation constructs to effect expression. Applicant contends recombinant gene expression in microbes using expression vectors is a mature technology which one of ordinary skill in the art may utilize through routine procedures.

The foregoing shows that the Examiner's reliance on Choi et al. is unfounded. Applicant contends Choi et al. was initially selected pursuant to an inappropriate standard requiring commercial/industrial viability:

### DISCUSSION

The use of PHA as a substitute for nondegradable petroleum-derived plastics hinges on the ability to produce it at a cost that is competitive with that incurred in the production of conventional plastics. From studies on the design and economic evaluation of the processes used for the production of PHAs (4), it was found that PHA productivity is one of the most important factors determining overall production cost.

...

Previous studies showed that recombinant *E. coli* was superior to wild-type PHB producers in all aspects except for productivity (6, 12, 18, 21, 33). Therefore, economical production of PHB by recombinant *E. coli* was thought to be possible if PHB productivity could be increased by cloning the *A. latus* PHA biosynthesis genes.

The Examiner's current comments appear to relate to the processes used to optimize PHB production for commercial purposes as well. Indeed, the Examiner implicitly admits this by arguing industrial productivity is not excluded from the claims. Final Office Action mailed 11 Decemeber 2007, page 13-14, bridging. Choi et al. is thus improperly relied upon just as the Examiner's self-equated Lin et al. reference. *CFMT, Inc. v. YieldUP International Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003) ("Enablement does not require an inventor to meet lofty standards for success in the commercial marketplace. Title 35 does not require that a patent disclosure enable one of ordinary skill in the art to make and use a perfected, commercially viable embodiment absent a claim limitation to that effect.").

**a. Lack of Guidance for Gene Transfection**

The Examiner begins to supplement the prior Enablement rejection by a conclusory assertion that there is no "essential detail on how to accomplish the difficult type of gene transformation claimed." Applicant contends constructing recombinant expression vectors and transforming them into microbes is very routine as the Examiner's own Choi et al. reference shows. The Examiner's unsubstantiated statements, contradicted by the Examiner's own references, are not a valid basis to question Enablement of the claimed methods.

**b. Lack of Guidance for Gene Identification and Isolation**

The Examiner alleges that there is no Guidance on how to identify and isolate genes useful in the claimed methods. Applicant respectfully suggests the Examiner refer to [0002], [0007]-[0013] and Figure 1 of the published application. This disclosure is of course exemplary in nature. One of skill in the art upon reading the Specification will be able to apply various other gene isolation methods to other microbes of interest.

**c. Lack of Guidance for Suitable Conversion Conditions & Lack of Guidance for Obtaining Synthetic Coals and/or Synthetic Petroleum**

The Examiner's comments under these two heading reiterates that there is no reduction to practice in the form of a working example. In addition the Examiner makes much of the absence of a chemical composition description of a synthetic petroleum and the absence of conditions for culturing recombinant microbes to produce synthetic petroleum. The Examiner presumes the chemical content of natural petroleum and various petroleum fractions is unavailable in the art. This is of course not so. The Examiner also presumes one of skill in the art will not know or be capable of determining culturing conditions such as temperature, pressure, volume, mixing rates and so forth. The Examiner's own references, Hemme et al. for example, demonstrate that one of ordinary skill in the art is fully enabled by the state of the art to determine appropriate conditions based on the particular host organism used. The Specification does not need "Guidance" such as, "The incubation temperature may generally be from 10 degrees to 75 degrees C, the optimal temperature depending on the specific microorganism used." Indeed, such rudimentary material is preferably left out of the Specification. MPEP 2164.01.

**d. Level of Skill in the Art**

Applicant and Examiner agree that the level of ordinary skill in the art is very high. The skilled artisan will have a sophisticated understanding and complex skill set with which the artisan may reduce the claimed methods to practice without undue experimentation.

**6. Conclusion**

The Examiner has not offered any valid rational basis for questioning Enablement of the pending claims. Applicant therefore requests the rejection be removed.

#### **IV. CONCLUSION**

In view of the above amendment, applicant believes the pending application is in condition for allowance. Applicant believes no other fee is due with this response. However, if a fee is due, please charge Deposit Account No. 06-2375, under Order No. HO-P03493US0 from which the undersigned is authorized to draw.

Dated: 07 March 2008

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